

What is claimed is:

1. A terrestrial digital broadcasting system,  
comprising:

5 a broadcasting station for multiplexing video, voice and  
additional signals into transport stream (TS) and transmitting  
the TS to the transmitting stations; and

a transmitting stations for receiving the TS and  
broadcasting the TS to receiving stations through a single  
10 frequency network,

wherein the broadcasting station includes:

a transmission synchronization means for inserting a  
field synchronization header to the TS in a predetermined data  
field period N, and

15 wherein the transmitting stations include:

a transmission synchronization detecting means for  
synchronizing the TS transmitted from the broadcasting station  
based on the field synchronization header; and

20 a trellis encoding means for generating initialization  
symbols of a predetermined length in a predetermined data  
field period M and synchronizing the TS outputted to the  
receiving stations.

2. The system as recited in claim 1, wherein the  
25 trellis encoding means includes:

a first switching unit for initializing output values of  
a trellis coded modulation (TCM) encoder and the memory by

performing switching to input values stored in the memory of the TCM encoder instead of input signals of the TCM encoder every M period; and

5 a second switching unit for initializing output values of a precoder and the memory by performing switching to input values stored in the memory of the precoder instead of input signals of the precoder every M period.

10 3. The system as recited in claim 1, wherein the field synchronization header is acquired by reversing a first segment header of data fields of an N period on a bit basis.

15 4. The system as recited in claim 3, wherein the transmission synchronization detecting means recognizes that valid TS is being received, if a field synchronization header of a  $B8_{16}$  value is detected in the first segment header and the value of  $47_{16}$  is detected in the segment headers of the other data fields.

20 5. The system as recited in claim 1, wherein the N value is adjusted based on the communication channel environment between the broadcasting station and the transmitting stations, and the M value is adjusted based on the communication channel environment between the broadcasting  
25 station and the transmitting stations.

6. A terrestrial digital broadcasting method using a

single frequency network, comprising the steps of:

a) inserting a field synchronization header to transport stream (TS) transmitted to a plurality of transmitting stations in a predetermined data field period N in a broadcasting station;

b) detecting the field synchronization header and synchronizing starting points of the TS inputted to each transmitting station in the transmitting stations;

c) synchronizing the TS outputted to receiving stations by generating initialization symbols of a predetermined length every predetermined data field period M with respect to the inputted signal; and

d) broadcasting the synchronized TS to the receiving stations.

7. The method as recited in claim 6, wherein, in the step c), the initialization symbols are generated by performing switching to input values stored in a memory of a TCM encoder and a precoder instead of the inputted signal.

8. The method as recited in claim 6, wherein the field synchronization header is acquired by reversing a first segment header of data fields of an N period on a bit basis.

9. The method as recited in claim 8, wherein in the step b), if a field synchronization header of a B8<sub>16</sub> value is detected in the first segment header of the N-period data

fields and a field synchronization header of a  $47_{16}$  value is detected in the headers of the other data segments, the transmitting station recognizes that valid TS is received and synchronizes the starting points of the TS inputted to each transmitting station by performing signal processing from a data field where the field synchronization header is detected.

10. The method as recited in claim 6, wherein the N value is adjusted based on communication channel environment between the broadcasting station and the transmitting stations, and the M value is adjusted based on communication channel environment between the broadcasting station and the transmitting stations.